

Appl. No. : 10/074,563
Filed : February 11, 2002

REMARKS

The specification has been amended as set forth above to replace the previously recited attorney docket nos. with the serial numbers of the corresponding patent applications and to rewrite the abstract. The change to the abstract is supported in the specification as-filed at paragraph [0008]. Claims 35, 41, 57, 59, and 66 have been amended to correct various typographical errors. These amendments do not narrow the scope of the claims and do not introduce new matter.

Specific changes to the specification and the amended claims are shown on a separate set of pages attached hereto and entitled VERSION WITH MARKINGS TO SHOW CHANGES MADE, which follows the signature page of this Amendment. On this set of pages, the insertions are underlined while **[deletions are bracketed and bolded]**.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: 4/9/02

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE ABSTRACT:

Chemical vapor deposition processes utilize chemical precursors that allow for the deposition of thin films to be conducted at or near the mass transport limited regime. The processes have high deposition rates yet produce more uniform films, both compositionally and in thickness, than films prepared using conventional chemical precursors. In preferred embodiments, [trisilane] a higher order silane is employed to deposit thin films containing silicon that are useful in the semiconductor industry in various applications such as transistor gate electrodes.

IN THE SPECIFICATION:

[0001] This application claims priority to U.S. Provisional Application No. 60/268,337, filed February 12, 2001; U.S. Provisional Application No. 60/279,256, filed March 27, 2001; U.S. Provisional Application No. 60/311,609, filed August 9, 2001; U.S. Provisional Application No. 60/323,649, filed September 19, 2001; U.S. Provisional Application No. 60/332,696, filed November 13, 2001; U.S. Provisional Application No. 60/333,724, filed November 28, 2001; and U.S. Provisional Application No. 60/340,454, filed December 7, 2001; all of which are hereby incorporated by reference in their entireties. This application is related to, and incorporates by reference in their entireties, co-owned and co-pending U.S. Patent Application Serial Numbers: 10/074,149; 10/074,722; 10/074,633; 10/074,564; and 10/074,534, all of which were filed on February 11, 2002.

IN THE CLAIMS:

35. (Amended) A compound Si-containing film in an integrated circuit, the compound Si-containing film having a thickness non-uniformity of about 5% or less and a compositional non-uniformity across the film of about:

20% or less for elements representing 1 atomic % or greater of the film; and

75% or less for elements representing 0.001 atomic % to 1 atomic % of the film.

41. (Amended) A process for depositing a SiGe material on a surface, comprising:

providing a chemical vapor deposition chamber having disposed therein a substrate[,];

introducing a gas comprised of a higher-order silane and a higher-order germane to the chamber; and

depositing a SiGe film onto the substrate.

57. (Amended) A process for depositing a Si-containing material on a surface, comprising:

providing a chemical vapor deposition chamber having disposed therein a substrate, the chemical vapor deposition chamber being equipped with a temperature controller configured to allow programming with multiple temperature control variables for a single recipe;

entering a temperature control variable T_1 into the temperature controller[,];

introducing a first gas comprised of $X_1\%$ of a first Si-containing chemical precursor to the chamber; wherein the X_1 is in the range of about 1×10^{-4} to about 100;

depositing a first Si-containing layer onto the substrate;

entering a temperature control variable T_2 into the temperature controller;

introducing a second gas comprised of $X_2\%$ of a second Si-containing chemical precursor to the chamber, wherein the X_2 is in the range of about 1×10^{-4} to about 100 and wherein the second silicon source is the same as, or different from, the first silicon source;

depositing a second Si-containing layer onto the first Si-containing layer, thereby forming a multi-layer Si-containing film having a thickness non-uniformity of about 5% or less and a compositional non-uniformity of about 20% or less for elements representing 1 atomic % or greater of the film; and

75% or less for elements representing 0.001 atomic % to 1 atomic % of the film.

59. (Amended) The process as claimed in Claim 57, which further comprises:

entering a temperature control variable T_3 into the temperature controller[,];

introducing a third gas comprised of $X_3\%$ of a third Si-containing chemical precursor to the chamber[,]; and

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depositing a third Si-containing layer onto the second Si-containing layer.

66. (Amended) An apparatus for depositing a Si-containing material on a surface, comprising:

a chemical vapor deposition chamber[,] ;

a vessel containing trisilane[,] ;

a feed line operatively connecting the vessel to the chemical vapor deposition chamber to allow passage of the trisilane from the vessel to the chemical vapor deposition chamber[,] ; and

a temperature controller operatively disposed about the vessel and maintained at a temperature between about 10°C and 70°C, to thereby control the vaporization rate of the trisilane.